



Docket Management
National Highway Traffic Safety Administration
Department of Transportation
Room PL-401
400 Seventh Street, SW
Washington, D.C. 20590

RE: Docket No. NHTSA-2001-9663

**COMMENTS OF CONSUMERS UNION OF UNITED STATES, INC.
TO
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ON
CONSUMER INFORMATION REGULATIONS;
FEDERAL MOTOR VEHICLE SAFETY STANDARDS;
ROLLOVER RESISTANCE
49 CFR Part 575**

Consumers Union of United States, Inc. (CU), the publisher of Consumer Reports magazine, is grateful for the opportunity to provide comments to the National Highway Traffic Safety Administration (NHTSA) on the Agency's plans to evaluate a number of driving maneuver tests for its information program to rate rollover resistance. As the nation's foremost nonprofit independent consumer product and service testing organization, CU has been testing and evaluating automotive vehicle performance and safety continuously since 1936. Based on these decades of experience, CU strongly believes that some form of dynamic testing should be an important component in a matrix of dynamic and static tests designed and integrated to evaluate and compare the overall rollover resistance of light vehicles (passenger cars, SUV's and light trucks). Further, in order to heighten consumer acceptance of any test program, it would be desirable to include where possible within the test matrix a dynamic test that simulates recognizable driving maneuvers. CU's belief in the importance of dynamic testing was

confirmed by Congress in the Transportation Recall, Enhancement, Accountability, and Documentation Act (TREAD) (Section 12), which calls upon NHTSA to develop a dynamic test for rollover that would be the basis for “developing meaningful consumer information.” TREAD requires that NHTSA complete its test proposal and rulemaking by November 1, 2002. CU strongly believes that consumer safety will be dramatically improved by NHTSA’s timely completion of this mandate.

As the Fatal Analysis Reporting System (FARS) data for 1999 reveals, in that year alone, 10,140 persons died as a result of light vehicle rollovers. Eighty (80) percent of those deaths occurred in single vehicle rollovers. All concerned parties agree that rollovers are complex events involving numerous variables that may sometimes appear to be conflicting and generally confounding. It may not be possible to perfectly account for every variable in any single test or even in a program that combines several tests. CU strongly believes, however, that this complexity should not become a pretext for failure to adopt the best available test program—including dynamic testing—for a consumer information program, a program that will likely result in an annual savings of many lives and debilitating injuries.

Along these lines, CU agrees with the Insurance Institute for Highway Safety (IIHS) that NHTSA is unnecessarily pessimistic about developing a meaningful driving maneuver test, based on the belief that such a test is meaningful only for “untripped rollover.” A hard and fast distinction between “tripped” and “untripped” rollover is misleading. A vehicle's dynamic performance that is related to untripped rollover is, by definition, related to tripped rollover as well. Often, tripped rollovers are the end result of losing control in an untripped situation. As we note in our comments herein, we believe that driving maneuver tests and static measurements together will provide information about the rollover tendencies of vehicles subjected to on- and off-road conditions.

Further, despite evidence that light trucks are more prone to rollover than cars, there is continuing disagreement over the extent to which the rollover problem is affected by vehicle characteristics. IIHS examined driver, environmental, and vehicle factors, looking at all single-vehicle fatal crashes occurring in the United States during a 4-year period and all single-vehicle injury crashes occurring in three large states. The Institute's conclusion: After taking into account differences in drivers and roadway environments (including differences in driver age and gender, roadway alignment and surface condition and whether the crash occurred in a rural area), a light truck is approximately twice as likely as a car to roll over in a single-vehicle crash. This analysis not only clarifies again the role of vehicle characteristics in these crashes but also underscores the urgent need to develop tests that evaluate and compare vehicle performance.

In carrying out its own dynamic testing for emergency handling in various forms for 28 years, CU has always taken into account the complexity of these evaluations.¹ CU's double lane change maneuvers are carried out objectively, expertly and in accord with valid and reasonable scientific principles. The tests provide a reliable basis for supporting CU's expert judgment that a vehicle that tips up severely during the CU avoidance maneuver tests exhibits dangerous behavior. Of the 120 vehicles put through the short course since 1988, three have tipped so severely as to have been judged Not Acceptable. But as a "pass-fail" check test, the CU test was not designed to differentiate the comparative rollover propensities of vehicles with the kind of specificity required for rating vehicles on a continuum across multi-level rating systems. In using double lane change tests to evaluate emergency handling, CU's test protocols seek to

¹ CU has long considered the double lane change avoidance maneuver to be a valuable test procedure. But, while CU has utilized double lane change avoidance maneuvers continuously for 28 years as part of a larger program to evaluate emergency handling, it has never proposed that NHTSA adopt its test procedures as a specific rollover test upon which to erect a consumer rollover information program.

maximize the advantages of such dynamic testing, while minimizing the potential problems that may inhere when one is evaluating a system with so many variables.²

CU believes that a combination of dynamic and static tests is the best approach for evaluating rollover propensity. The following comments seek to provide responses to several of the areas that NHTSA has asked commentators to address in the questions set out in the Request for Comments. (See 66 Fed. Reg. at 35187).

I. CU Believes that a Combination of Maneuvers Would be Best for Rollover Ratings.

Due to the complexity of the rollover event, and all of the various vehicle factors affecting a vehicle's stability, CU believes a suite or matrix of on-road tests is required to evaluate rollover propensity. Rather than a single test, which may not adequately assess overall rollover propensity, a suite of tests should assess vehicle performance at handling limits and also encompass the necessary checks and balances to minimize the chances that vehicles may be engineered to pass one type of test to the detriment of other important safety attributes. At a minimum, these on-road vehicle maneuvers should be designed to include a steering reversal that will produce a lateral force of at least 1.0 g. Other tests would be needed to evaluate overall handling. CU also believes that SSF or other non-driving evaluations do have a part to play in the rollover assessment matrix, but they should be a relatively minor contributor, and that dynamic, on-road driving tests should represent the major components of the overall assessment.

² a) No two human drivers are exactly alike. Knowing this, Consumers Union uses a panel of skilled engineers to test many aspects of a vehicle's performance, including three engineers to test SUVs, Minivans and 4x4 Pickups, through our emergency handling Short Course test. These three engineers may well have slightly different driving styles, as do consumers in general—that is why having multiple drivers is so important. Moreover, they are highly experienced and skilled drivers, and because the test is carefully controlled, the panel's overall test results are highly consistent. Over the years, we have rarely seen more than minor differences in test results among individual drivers. In our opinion, the use of human drivers is a valid, time-tested approach that simply requires certain functions to be performed with careful scrutiny. (b) The dynamic tests must be performed on a documented track surface having a coefficient of friction paralleling that of a good highway. A protocol must be included to account for significant tire wear and track condition, based on the ambient conditions that can influence the frictional characteristics.

The matrix of tests highlighted below are suggested in general terms as a good combination of tests that could provide an evaluation of a vehicle's propensity to roll over while also providing the necessary checks and balances for evaluating other important handling attributes.

- 1) SM – Static Measurement: Use of either the Static Stability Factor or Centrifuge test should be included and measured under two conditions, once with the vehicle and only a driver aboard (SM-II) and again with the maximum number of passengers, and an evenly distributed load to bring the vehicle up to GVW (SM-gvw). Both measurements are important because when an SUV is full of passengers and the load is evenly distributed, the center of gravity (cg) height increases, and stability is further reduced. This increased cg height resulting from increased loading does not occur with sedans. CU believes, from the information provided, that the Centrifuge test would likely produce a more accurate measurement of the effect of the center of gravity.³ This test does take into account the effect of the shift of the center of gravity due to the vehicle's body roll.
- 2) RRT - Rollover Resistance Tests: These tests should include a combination of dynamic tests that together provide an objective evaluation of the on-road rollover resistance when the vehicle is pushed to its handling limits. In our view, these tests should include a reverse steer maneuver that could induce a lateral acceleration of 1.0 g or more. Moreover, it has been suggested previously by NHTSA that it is prudent to test each vehicle under the worst-case conditions the vehicle could encounter in real world accidents—conditions that take into

³ We believe that the Centrifuge test would likely make a more accurate replacement for Static Stability Factor. CU agrees with NHTSA, however, that Congress' mandate to NHTSA in TREAD to develop a rollover test was a mandate to develop, as at least part of testing protocol, a driving test. CU believes that the Centrifuge test lacks the essential benefits of a dynamic driving test, i.e., testing how the vehicle behaves as a unit, evaluating the interaction between the vehicle's steering, suspension and tires. See the discussion of ESC herein and CU's experience testing vehicles with this new technology.

account the vehicle's suspension, tire grip, and steering response. We agree with such an approach.

The reverse-steer maneuver could be derived from several sources, such as the type found in the VDA Double Lane Change, the Path Corrected Limit Lane Change, the double lane change avoidance maneuver (Driver or Controller), or the Fishhook, where the steer inputs could generate a lateral acceleration of at least 1.0 g. Vehicle speed, steering input and wheel lift can be recorded. This test should be conducted first with only a driver aboard (RRT-II) and second, with the maximum number of passengers and an evenly distributed load to bring the vehicle up to GVW (RRT-gvw).

Because test driver safety is always a serious concern, efforts should be made to use the results from the Static Measurement to take account of the raised center of gravity in SUVs due to vehicle loading. In some cases, this could obviate the need to test the vehicles when fully loaded and thereby reduce risk to the test driver and reduce testing costs.

- 3) VHT - Vehicle Handling Tests: Vehicles could be designed to resist rolling over or tipping by compromising tire grip and vehicle handling responsiveness. This could negatively affect other elements of safety by making vehicles less responsive and less maneuverable. CU believes that measurements of vehicle handling should be included in reporting on and measuring rollover resistance. This is why CU is recommending a group of tests to assess the vehicle's overall on-road performance, including rollover resistance, tire grip and vehicle handling. These tests should include a steady state lateral acceleration test, such as a skid pad test, and track type tests that assesses the vehicle's controllability, response and grip. The results from this series of tests would then be compiled into the matrix with appropriate weights given to each aspect to represent an overall measure of a vehicle's stability.

II. How NHTSA could address the issue of long term and short term variations in pavement friction in conducting comparative driving maneuver tests of vehicle rollover resistance for a continuing program of consumer information.

An important element of an auto test facility is the surface condition of the track. Most highways in the United States have a wet skid number between 40 and 60, which is a measure of the coefficient of friction between a control tire and the wet pavement.

To determine the effect of temperature and humidity on the frictional characteristics of a dry surface, an evaluation should be conducted using a skid trailer on a dry surface to assess any changes that may exist due to climatic conditions. Once the acceptable range of climatic conditions has defined the track's surface characteristics, measurement must be conducted regularly to ensure the surface properties are known as the surface degrades. Once the appropriate range has been established, vehicle testing should occur only within that range.

Consumers Union believes that the track surface should have a dry skid number around 90 (which translates to a wet skid number of about 60) to ensure that the testing surface is representative of the real world. A track with a low skid number will allow a vehicle to slide more easily than it would on a higher skid number surface. Under these conditions, the testing would not evaluate the vehicle as it would perform on a good quality road. If the vehicle slides on a low grip surface, it could mask the tendency of that vehicle to tip up or rollover on common highways, and therefore fail to provide an accurate evaluation of what might happen in the real world.

CU recommends that only one test facility should be used by NHTSA for its vehicle testing to control the effects that track-to-track surface variability could have on test results. It would also be appropriate for NHTSA to publish the surface characteristics of the track it uses to conduct its tests so that manufacturers and researchers could simulate the test surface.

III. Based upon its testing experience, CU believes that ESC systems should intervene forcefully once an emergency situation arises.

CU has tested 19 vehicles fitted with ESC (6 SUVs, 2 wagons, 11 sedans). From those tests, we found that these systems not only helped the vehicle stay on course, but also, in the vehicles that permitted direct comparison between having and not having ESC in control, faster speeds were achieved through our avoidance maneuver tests and greater driver confidence was experienced during those tests.

CU tests all vehicles that are equipped with ESC with the ESC operating normally (it is usually a default system). In two models, we tested two versions of the same vehicle, an early model without ESC and a later model with standard ESC. In both cases (1999 and 2001 Toyota Land Cruiser, and 1998 and 2001 Lexus RX300), the emergency handling of these vehicles was much improved, making it safer and easier to control.

CU has not evaluated any automatic brake intervention systems, so we are unable to comment on their performance in vehicle application.

From our experience, all ESC systems do not operate the same; some intervene heavily to slow the vehicle and correct the slide, whereas other systems are less intrusive and allow the car to slide more before the system intervenes. In our opinion, the better systems allow for spirited driving in normal conditions, but then intervene rapidly and forcefully when the vehicle gets into an emergency situation. Based on its testing experience, CU believes that the system should intervene to control the slide and slow the vehicle as much as possible. Most drivers are not often exposed to emergency situations and so are unprepared for such events. Based on our track tests, CU believes that a rapid and forceful intervention is the best strategy for ESC systems. This is especially true for vehicles that by their nature have sloppy handling, such as SUVs. A less

intrusive system is appropriate in vehicles with secure, responsive handling, such as sports cars and sports sedans.

CU has had test-based experience with the four vehicles that NHTSA identified as evaluation vehicles for its test development program. From our test results,⁴ we found all but the Blazer to exhibit no unusual behavior in either the Short or Long Course. (CU also tested an early version of the Mercedes ML320, which did not have ESC, September 1998 *Consumer Reports*). The Chevrolet Blazer was a 1998 LT version with a ZW7 premium ride package, and may not be sufficiently similar to the NHTSA Blazer to assume similar performance characteristics. CU also recommends that NHTSA include in its test development protocol one of the larger SUVs that has seven seat capability, for example the Ford Expedition or Chevrolet Tahoe Class, testing them unloaded as well as fully loaded. By doing so, NHTSA will have the opportunity to evaluate the effects that a higher center of gravity has on the stability of larger SUVs when they are fully loaded.

Conclusion: Based on 65 years of product testing experience, CU believes that complex products like motor vehicles are evaluated best when their systems are tested in their entirety. The physical properties of a brake pad, for example, are undoubtedly relevant but yet not nearly sufficient to assess a vehicle's ability to stop safely. Rather, a suite of dynamic brake tests of the vehicle are the best way to evaluate the braking system acting as a whole, as CU does in its road and track tests. We believe the same strategy holds for emergency handling. We believe NHTSA

⁴ CU tested and reported on four vehicles that were the same as or similar to NHTSA's test vehicles: 2001 Ford Escape, March 2001 *Consumer Reports*, 2001 Toyota 4Runner, October 2001 *Consumer Reports*, 2000 Mercedes ML430, June 2000 *Consumer Reports*, and 1998 Chevrolet Blazer, May 1998 *Consumer Reports*. As we noted in the May 1998 issue, "The *Blazer* handled poorly in our emergency avoidance maneuvers, occasionally lifting both right wheels several inches off the pavement. But it didn't threaten to roll over." *Consumer Reports* rated the vehicle's emergency handling as "Poor."

is on the right path in developing a suite of tests that taken together will help consumers make a rational choice in their quest for safer vehicles for their families.

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Respectfully submitted,

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